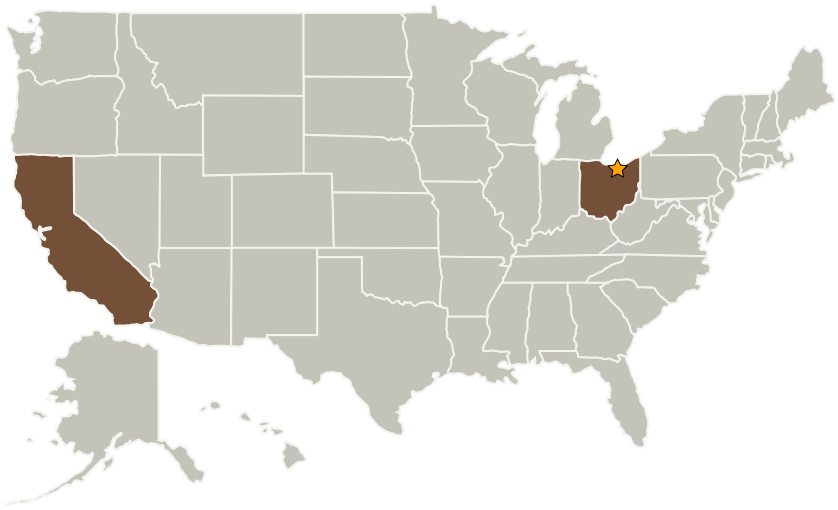
A High-Efficiency Compact SiC-based Power Converter System, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

Wide bandgap SiC power devices have the potential for reliable operations at higher junction temperatures, higher voltages, higher frequencies and thus higher power densities than what can be achieved with Si devices. These advantages enable the SiC technology-based power conversion systems (PCM) to be made smaller, lightweight, more efficient and robust. Recent studies predicted that the volume of a power converter system could be reduced five times through the utilization of SiC power devices. Despite this potential promise and encouraging results, more studies are needed to address the design and fabrication of SiC-based PCMs before their full potential can be realized. This project will develop an ultrahigh-efficiency, light and compact power converter system based on emerging SiC semiconductor technologies, quantifying the system benefits and addressing the related technical issues. The Phase I work include: (1) Circuit design of an SiC-based converter and modeling to evaluate the converter performance (power loss, efficiency, temperature rise, and weight/size heatsink etc.), and (2) High temperature packaging and high power density thermal management to support the SiC converter.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Aegis Technology, Inc.	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Santa Ana, California

Primary U.S. Work Locations	
California	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.3 Power Management and Distribution
    - TX03.3.3 Electrical Power Conversion and Regulation